Conference Reports: Society of Automotive Engineers (SAE)

LCA on the Third SAE Conference on Total Life Cycle in Graz, Styria, Austria December 1st to 3rd, 1998

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At the Total Life Cycle Conference of the Society of Automotive Engineers, Inc. in the pleasant and very hospitable city of Graz, 67 papers were presented or issued and 7 panel discussions demonstrated a broad spectrum of experiences and opinions. During three days of parallel sessions, from December 1-3,1998, 191 participants, primarily of North America and Europe but also of Asia and Australia, represented the principal OEMs as well as important suppliers. The lectures and panel discussions as well as the small exhibition were held in a constructive atmosphere.

Nearly the whole range of Life Cycle Assessment's points of interest were presented and discussed such as, for example, case studies, Life Cycle Impact Assessment and simplified LCAs:

Several contributions dealt with Life Cycle Studies on a complete car, e.g. of the Japanese Automobile Manufacturers Association.Nevertheless, the different aspects of the most complex project – a Life Cycle Inventory of a generic car representing a Chrysler/Ford/GM vehicle – were reflected during six presentations. The goal of this project of the Life Cycle Assessment Special Topics Group within the United States Automotive Materials Partnership (USAMP/LCA) had been to provide a benchmark for future vehicles. In total, the effort took approximately five years with a cost of 2.7 million Dollars. Within USAMP/LCA, the Aluminum Association, the American Iron and Steel Institute and the American Plastic Council have supported the efforts of the three car manufacturers in studying 664 automotive components. John L. Sullivan, Scott T. Chubbs, Steve Hentges, Steven D. Pomper, Remi Coulon, Greg Keoleian and Kevin Brady presented details on results, the tasks involving the stakeholders, data quality, methodology, peer review and lessons learned. The inventory effort for this project, e.g. compiling data of 213 locations only for aluminum production, was tremendous. However, 50% of the time was spent with discussions on methodology.

Other case studies presented such individual automotive components as e.g. air deflection systems, bumpers, car body sheets, undershields, console sides, fuel tanks. Often, the case studies were linked with recommendations for the designer. Bernd Kiefer, for example, reported that the substitution of steel by magnesium only makes sense from a global warming point of view if the weight saving is above 48-58% due to the SF_6 emission of the specific magnesium producer. This example represented the strength of LCA in terms of pointing out environmental hot spots for future technological innovations, e.g. in the production of magnesium.

The aspect of simplifying LCA – to provide data in time for the designers and minimize the time needed for projects as of USAMP/LCA – and other Life Cycle related tools, in particular of Design for Environment, was the center topic of different presentations, e.g. of Gerald Rebitzer, Phil Lawrence, Masako Yamato. Due to the complexity of the automotive components, as well as the more and more reduced time available within product development, these approaches seem to be necessary.

The Asian dimension was introduced not only by presenters of Asian manufacturers but also by Walter M. Kreucher who presented a case study on coal conversion in china. This case study is the result of a joined effort of 900 companies and has been mentioned by Dennis Schuetzle as being a starting point of LCA use by the Chinese government.Specific LCA-methodology guidelines for the automotive sector were presented by Lynne Ridge for the European council of Automotive Research and Development (EUCAR). Important aspects are not only the use phase, but also end-of-life vehicles (ELV), impact assessment, data and quick LCA tools. The very automotive-specific topic of the use phase was also covered by e.g. Reinhard Eberle who modeled the weight dependency of this use phase for passenger cars as based upon practical tests. He proposed that there is a range from 0.34 to 0.48 l/(100 kg*100 km) for BMW gasoline powered vehicles and 0.29 to 0.33 l/(100 kg*100 km) for diesel vehicles. However, he also pointed out the important influence of the aerodynamic and rolling resistance parameters, the efficiencies of the power train, the rear axle's transmission ratio and the driven velocity profile. Obviously, care has to be taken by choosing the weight-induced fuel saving coefficients.

A general, i.e. not automotive specific, point of interest is the problem of LCI data quality as discussed by Konrad Saur who proposed the addition of two different kind of errors: first for each data category (with a range from an assumed error of

only ± 2.5% for energy data to ± 20.0% for eco toxicity data) and second for different data sources (with a range from ± 2.5% project-specific primary data to ± 25% for old literature data). Obviously there are a great number of assumptions and choices in this pragmatic approach.

One of the most controversial indicators within Life Cycle Impact Assessment (LCIA) was the topic of Karl-Michael Nigge's presentation on "A Method for the Site-Dependent Life Cycle Impact Assessment of Toxic Air Pollutants from Traffic Emissions". He proposed the inclusion of the site dependency of mobile emission sources by classifying emission sites in terms of their radial population density distribution and the annual mean wind speed. Discussions developed during the course of combining this approach with the existing inventory data and the meaningfulness of results. Another approach to include the spatial dimension was demonstrated by Matthias Finkbeiner who proposed that emissions in non-sensitive areas (e.g. concerning the acidification of the sea) and all emissions under the thresholds for toxic emissions be to omitted.

Some of the already well-known software tools were presented during these sessions as well – and some people in the audience have asked themselves whether the difference between a scientific conference and a marketing event was respected by all presenters providing a software.

Some of the panels specifically covered the subject of LCA. Remarkable figures were presented from a panel of plastic suppliers. One is, for example, the relatively small contribution of their own in-house processes, i.e. what can be directly influenced by process improvements. In another panel, the increasingly important interdependency between LCA and policymaking was addressed with a focus on the governmental efforts to apply it for their decision/policymaking. One major conclusion was that related efforts are much more progressive in the European Union and on a member state level than in the United States or Japan.

The different presentations and discussions have shown that there is a big challenge for environmental, automotive engineering due to (1) the increased world population and consequently for an increased demand of mobility as well, (2) the increased safety standards and thus an increased weight of vehicles. The conference has demonstrated that the automotive industry applies widely Life Cycle tools, often for internal purposes as a support for product development. However, the discussions have shown that there are still limitations in the different Life Cycle approaches.

Conference proceedings with the presented papers are available at the SAE (Fax: ++1/7247765760, reference to ISBN 0-7680-0317-2). The next SAE Total Life Cycle conference will be hold in Detroit during spring 2000.

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